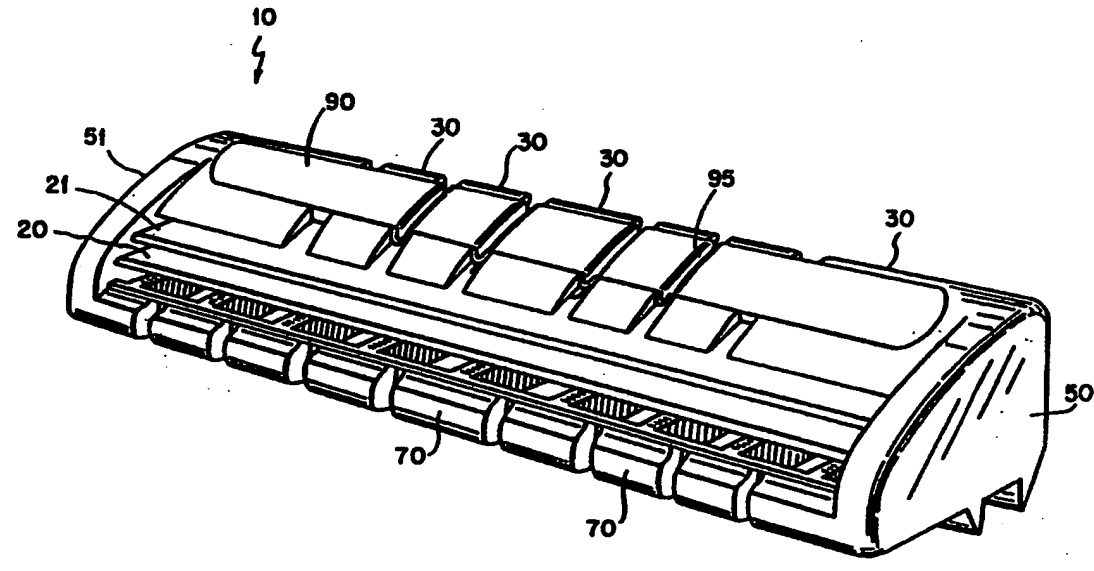


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(54) Title: SHAVING AID WITH INCREASED FLEXIBILITY  (57) Abstract <p>A wet-shaving razor unit of the flexible design having a shaving aid attached to its cap portion for lubricating the skin during shaving. The shaving aid is formed with at least one groove extending in a direction substantially perpendicular to the axis of flexing of the blade support. The inclusion of at least one groove reduces the resistance of the shaving aid to flexing, thereby enabling the flexible razor unit to more readily follow the contour of the surface being shaved.</p>		

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-1-

SHAVING AID WITH INCREASED FLEXIBILITYBACKGROUND OF THE INVENTION

The present invention relates to a shaving aid for a flexible wet-shaving razor unit and, more particularly, to an improved shaving aid having at least one groove to enhance the flexing of the shaving aid in response to forces encountered during shaving.

Various types of shaving aids are known in the razor industry. One popular type of shaving aid contains at least one water insoluble polymeric matrix, along with a water soluble material which exudes out of the insoluble matrix upon contact with water during shaving.

In the past, shaving aids have been attached to various parts of a wet-shaving razor unit. For example, shaving aids have been mechanically attached to the cap portion of the razor unit. Shaving aids have also been mechanically attached forward of the blade cutting edge, e.g., on the guard bar.

Today, the use of flexible wet-shaving razor units, such as disposable razors and cartridges, has become quite common. These flexible razor units, such as the ones disclosed in commonly-owned U.S. Patent No. 4,854,043 and U.S. Patent Application Serial No. 07/563,926 filed on August 7, 1990, represent a significant advance in the shaving field. In particular, the flexible razor unit flexes in response to forces encountered during shaving, thereby enabling the razor unit to conform to the natural contour of the surface being shaved. In turn, this brings a greater portion of the blade(s) into effective, cutting contact with the surface being shaved.

Until now, there has been a need in the art for a shaving aid suitable for attachment to a razor unit of the

-2-

flexible design. In this regard, the shaving aids of the prior art, if attached to a flexible razor unit, would substantially reduce, if not eliminate, the flexibility of such unit. This reduction in flexibility would limit the effectiveness of the razor unit. There is therefore a need in the art for a shaving aid capable of attachment to a flexible wet-shaving razor unit without reducing the flexibility of such unit.

SUMMARY OF THE INVENTION

The present invention, which addresses the problems associated with the prior art, relates to a flexible wet-shaving razor unit having at least one blade with an exposed edge, a flexible blade support structure and a shaving aid having at least one active ingredient and formed with a groove extending in a direction substantially perpendicular to the axis of flexing of the blade support.

According to one preferred embodiment of the present invention, the flexible blade support structure is a substantially continuous thermoplastic body in which the blade is secured substantially rigidly against movement and vibration during shaving. In particular, the substantially continuous thermoplastic body is formed with a plurality of discrete blade supports for supporting the bottom of the blade. At least two of these blade supports are connected by a flexible corrugation. Blade retainers, which are integrally molded to the blade supports, extend over the top of the blade. The shaving aid of the present invention is preferably sequentially molded in a single step molding operation onto the blade retainers.

According to this embodiment of the present invention, a plurality of grooves are formed in the shaving aid and are advantageously positioned between neighboring blade retainers.

-3-

Another embodiment of the present invention is directed to a method for forming a flexible razor head having a shaving aid with increased flexibility. The method includes the first step of positioning at least one blade having an exposed edge into a mold cavity having male mold members. A thermoplastic material is then injected into the mold cavity to form a flexible blade support around the blade. Next, at least one of the male mold members is removed from the mold cavity. A second cavity is then defined wherein the second cavity is defined by at least a portion of the flexible blade support. Finally, a polymeric material having at least one active ingredient is injected into the second mold cavity, thereby forming a shaving aid which is attached to the flexible blade support and which has at least one groove extending in a direction substantially perpendicular to the axis of flexing.

The shaving aid of the present invention may be employed with many types of flexible wet-shaving razor units designed to follow the contour of an irregular surface. The groove disposed in the shaving aid reduces the resistance of the shaving aid to flexing, thereby enabling the flexible razor unit to more readily follow the contour of the surface being shaved. In turn, this brings a greater portion of the blade into effective, cutting contact with the surface being shaved.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top, perspective view of a preferred embodiment of the present invention;

Figure 2 is a right, elevated side view of the razor unit illustrated in Figure 1;

-4-

Figure 3 is a top view of the razor unit illustrated in Figure 1;

Figure 4 is a front, elevational view of the razor unit illustrated in Figure 1;

Figure 5 is a rear, elevational view of the razor unit illustrated in Figure 1;

Figure 6 is a bottom view of the razor unit illustrated in Figure 1;

Figure 7 is a left, elevated side view of the razor unit illustrated in Figure 1;

Figure 8 is a front, elevational view of the razor unit of the present invention in a flexed position; and

Figure 9 is a cross-sectional view of a molding cavity used in accordance with the method of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

For purposes of illustration, one embodiment of the present invention is illustrated in Figures 1-8. In particular, the illustrated razor unit, i.e., cartridge 10, is designed for attachment to a separate handle mechanism. Cartridge 10 includes two sharpened blades, that is, a seat blade 20 and a cap blade 21. Blades 20, 21 are supported by a flexible blade support structure, which in the illustrated embodiment is a substantially continuous body wherein the blades are secured substantially rigidly against movement and vibration during shaving. A razor unit having a substantially continuous body is described in commonly owned co-pending, U.S. Patent Application Serial No. 07/563,926 filed on

-5-

August 7, 1990, incorporated herein by reference. The substantially continuous body includes upper blade retainers 30 (which together form the cap of the razor unit), side walls 50, 51 and lower blade supports 60. Disposed forward of seat blade 20 are a plurality of guard bar segments 70. The entire blade support structure is designed to flex in response to forces encountered during shaving, thereby allowing the blades to conform to the contour of the surface being shaved.

Shaving aid 90 is formed along the top of flexible cartridge 10 and extends across substantially the entire length of the cartridge. The shaving aid is molded into depressions formed in blade retainers 30 in order to provide a smooth surface conforming to the geometry of the cap of the cartridge. As best shown in Figure 4, blade retainers 30 are advantageously formed such that spaces remain between neighboring blade retainers 30. This space increases the flexibility of the overall flexible blade support structure, while providing a convenient location for grooves 95 in the shaving aid. Since cartridge 10 is designed to flex along an axis substantially parallel to the exposed edges of blades 20, 21, grooves 95 are advantageously disposed substantially perpendicular to the blade edges.

According to this illustrated embodiment, as best shown in Figure 5, neighboring blade supports 60 are attached by corrugations 65. The illustrated embodiment includes a flexible blade support structure which is integrally molded in a single molding step. A method for integrally molding a blade support structure is described in commonly-owned U.S. Patent Application Serial No. 07/541,225 filed June 20, 1990, incorporated herein by reference. Alternative blade support structures formed of a plurality of separately formed elements would also benefit from the present invention.

-6-

While the illustrated embodiment of the present invention discloses four grooves disposed in the shaving aid, the present invention may be practiced with a greater or fewer number of such grooves. The shaving aid may be formed of various substances known to those in the shaving industry. One popular active ingredient is polyethylene oxide which has been found to provide desirable lubricity to shaving devices during wet-shaving.

The polyethylene oxide active ingredient may include a mixture of high molecular weight polyethylene oxide and low molecular weight polyethylene oxide. For example, a mixture of POLYOX COAGULANT polyethylene oxide having a molecular weight of about 5 million and POLYOX WSR-N-750 polyethylene oxide having a molecular weight of about 300,000 has been found suitable.

Other compatible active ingredients which may also be incorporated into the shaving aid include:

(a) A lubricating agent for reducing the frictional forces between the razor and the skin, e.g., a micro-encapsulated silicone oil, polyurethane-polyvinylpyrrolidone interpolymers, etc.

(b) An additional agent which reduces the drag between the razor parts and the shaver's face, e.g., a natural polysaccharide derived from plant materials such as guar gum.

(c) An agent which modifies the chemical structure of the hair to allow the razor blade to pass easily through the whiskers, e.g., a depilatory agent.

-7-

(d) A cleaning agent which allows the whiskers and skin debris to be washed more easily from the razor parts during shaving, e.g., a silicone polyethylene oxide block copolymer and detergent such as sodium lauryl sulphate.

(e) A medicinal agent for killing bacteria, or repairing skin damage and abrasions.

(f) A cosmetic agent for softening, smoothing, conditioning or improving the skin.

(g) A blood coagulant for the suppression of bleeding that occurs from nicks and cuts.

(h) An astringent for constricting blood vessels, thereby stemming the flow of bodily fluids such as lymph, which may exude from skin that has been irritated during shaving.

A flexible razor unit having a shaving aid according to the present invention may be formed through an insert molding procedure. Referring to Fig. 9, the procedure includes the first step of positioning seat blade 20 into a first mold cavity. Seat blade 20 is supported by a guard bar insert 110 and a male mold support member 112. A spacer bar 114 is positioned over seat blade 20. Spacer bar 114 allows cap blade 21 to be fixed in a spaced relationship with respect to seat blade 20. An upper mold member 116 is then positioned over the blade arrangement, thereby enclosing and completing the first mold cavity. Upper mold member 116 includes a cap forming cavity 118. Included in cap forming cavity 118 are male mold members 120, which are capable of forming a continuous substantially rectangular depression in the cap of the razor unit. The depression is formed substantially parallel to the blade edge.

-8-

After the upper mold member is positioned in place, a thermoplastic material is injected into the first mold cavity. The thermoplastic material fills the mold cavity, thereby encasing the blades and forming the flexible blade support. After the thermoplastic material has set, the upper mold member is removed. Because of male mold members 120, a continuous substantially rectangular depression is formed in the cap of the razor unit.

At this point a second upper mold member is positioned over the blade arrangement. This second upper mold encloses the depression previously formed in the cap. A polymeric material having at least one active ingredient is then injected into the depression, thereby forming the shaving aid.

Those skilled in the art of molding will appreciate that by reducing the number of separate sites at which shaving aid material is positioned on the razor unit, the number of inlet ports which must be designed into a mold member are minimized. In the present invention, a continuous substantially rectangular depression is formed in the cap of the razor unit and, thus, the shaving aid of the illustrated embodiment can be formed using a single inlet port. The second upper mold member includes male mold members that form grooves 95 in the shaving aid. These grooves are formed substantially perpendicular to the axis of flexing and decrease the resistance of the shaving aid to flexing.

As described above, a polymeric material having at least one active ingredient is injected into the depression formed in the cap. After the polymeric material has set, the second upper mold member is removed, allowing the molded razor unit to be removed from the mold.

-9-

While there have been described what are presently believed to be the preferred embodiments of the invention, those skilled in the art will realize that various changes and modifications may be made to the invention without departing from the spirit of the invention, and it is intended to claim all such changes and modifications as fall within the scope of the invention.

-10-

WHAT IS CLAIMED IS:

1. A flexible wet-shaving razor unit having at least one blade with an exposed edge comprising:

5 a flexible blade support for supporting said exposed blade, said flexible blade support designed to flex along at least one axis in response to forces encountered during shaving;

10 a shaving aid having at least one active ingredient, said shaving aid attached to said flexible blade support and having at least one groove extending in a direction substantially perpendicular to said axis of flexing for enhancing the ability of said shaving aid to flex in response to said forces.

2. The razor unit according to claim 1, wherein said flexible blade support is a substantially continuous thermoplastic body in which said blade is secured substantially rigidly against movement and vibration during shaving.

3. The razor unit according to claim 1, wherein said flexible blade support includes at least two blade platforms, at least one corrugation between said at least two blade platforms, and a plurality of discrete blade retainers integrally formed with said blade support and disposed above and adjacent to said blade.

4. The razor unit according to claim 3, wherein said shaving aid extends continuously between at least two of said blade retainers.

5. The razor unit according to claim 4, wherein said at least one groove is positioned between said blade retainers.

-11-

6. The razor unit according to claim 1, wherein said shaving aid is chemically bonded to said flexible blade support.

7. The razor unit according to claim 1, wherein said active ingredient is polyethylene oxide.

8. The razor unit according to claim 1, wherein said axis is parallel to said exposed edge.

9. A method for forming a flexible razor head comprising the steps of:
positioning at least one blade having an exposed edge in a first mold cavity;

5 injecting a thermoplastic material into said first mold cavity to form a flexible blade support around said blade, said flexible blade support designed to flex along at least one axis in response to forces encountered during shaving;

10 removing at least a portion of said first mold cavity;

defining a second mold cavity wherein said second mold cavity is defined by at least a portion of said flexible blade support; and

15 injecting a second polymeric material having at least one active ingredient into said second mold cavity and forming a shaving aid attached to said flexible blade support having at least one groove extending in a direction substantially perpendicular to said axis of flexing.
20

10. The method according to claim 9, wherein said flexible blade support is formed with at least two blade platforms, at least one corrugation between said at least two blade platforms, and a plurality of discrete blade retainers integrally formed with said blade platforms and disposed above and adjacent to said blade.
5

-12-

11. The method according to claim 10, wherein said shaving aid is formed such that it extends continuously between at least two of said blade retainers.

12. The method according to claim 11, wherein said at least one groove is positioned between said blade retainers.

13. The method according to claim 9, wherein said positioning step includes positioning two blades in said first mold cavity.

14. The method according to claim 9, wherein said shaving aid is molded in a second mold cavity which is remote from said first mold cavity.

15. The method according to claim 9, wherein said shaving aid is chemically bonded to said blade support.

16. The method according to claim 9, wherein said active ingredient is polyethylene oxide.

17. The method according to claim 9, wherein said axis is substantially parallel to said exposed edge.

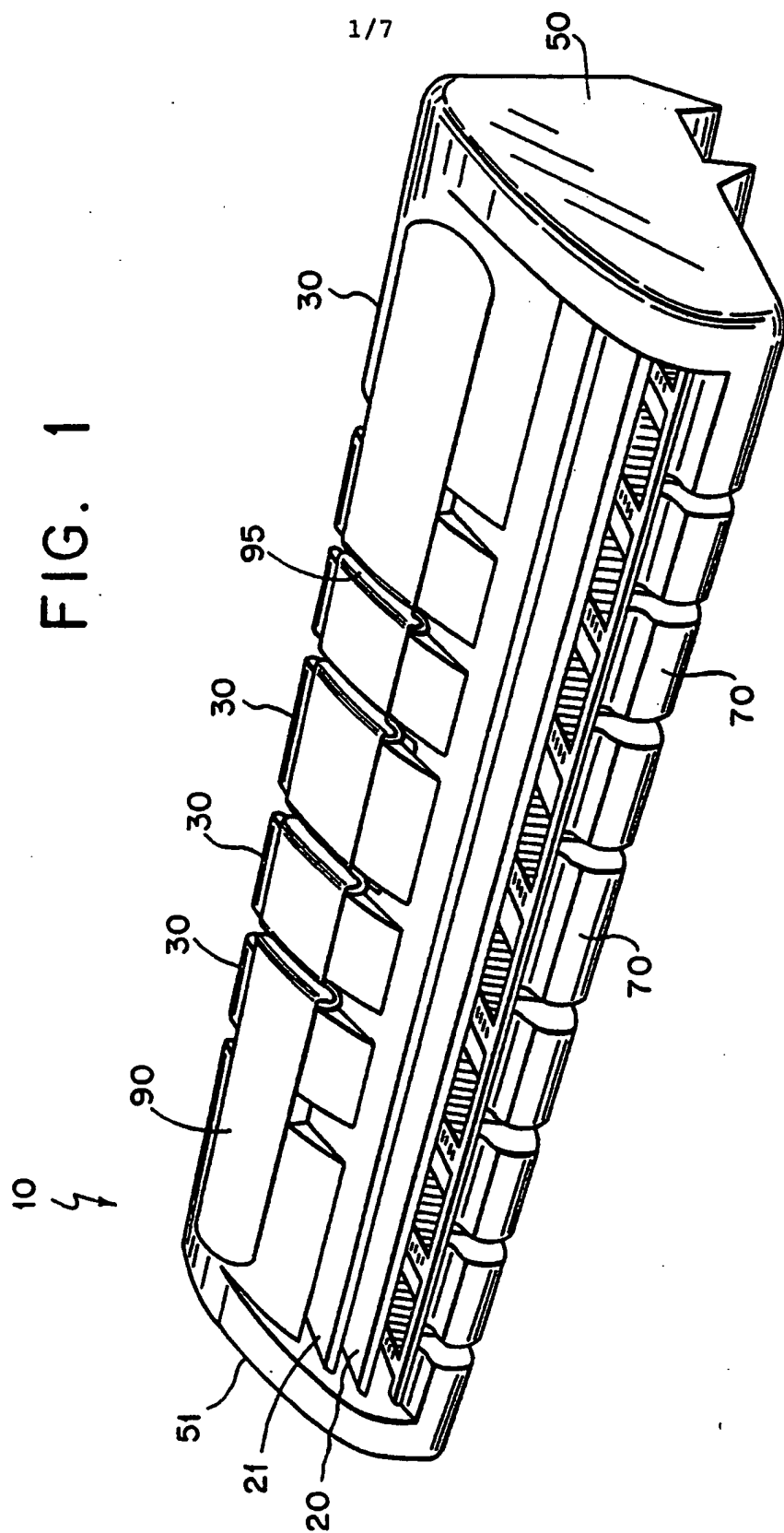
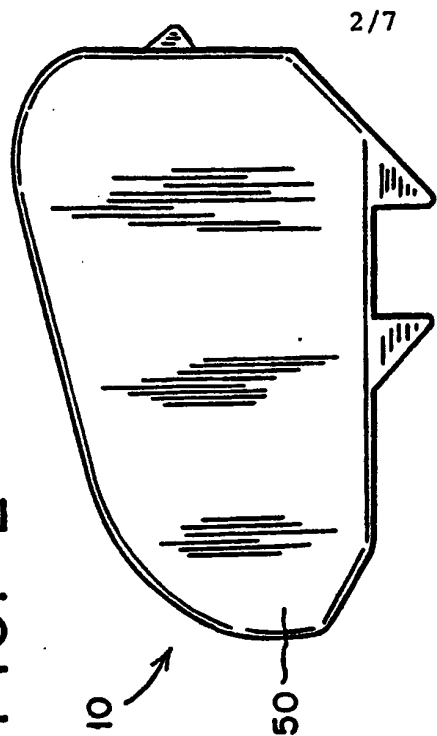


FIG. 2



2/7

FIG. 4

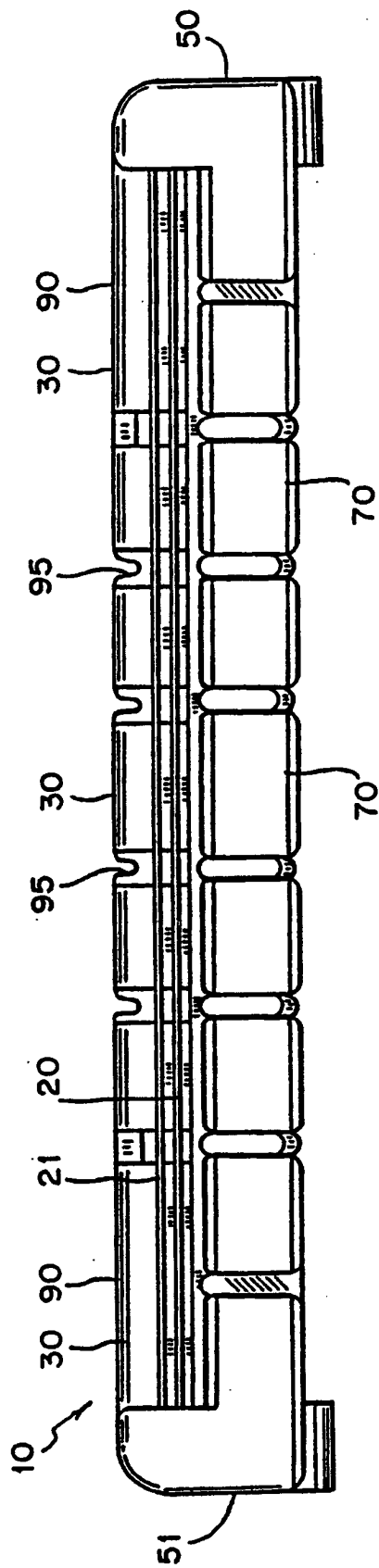


FIG. 3

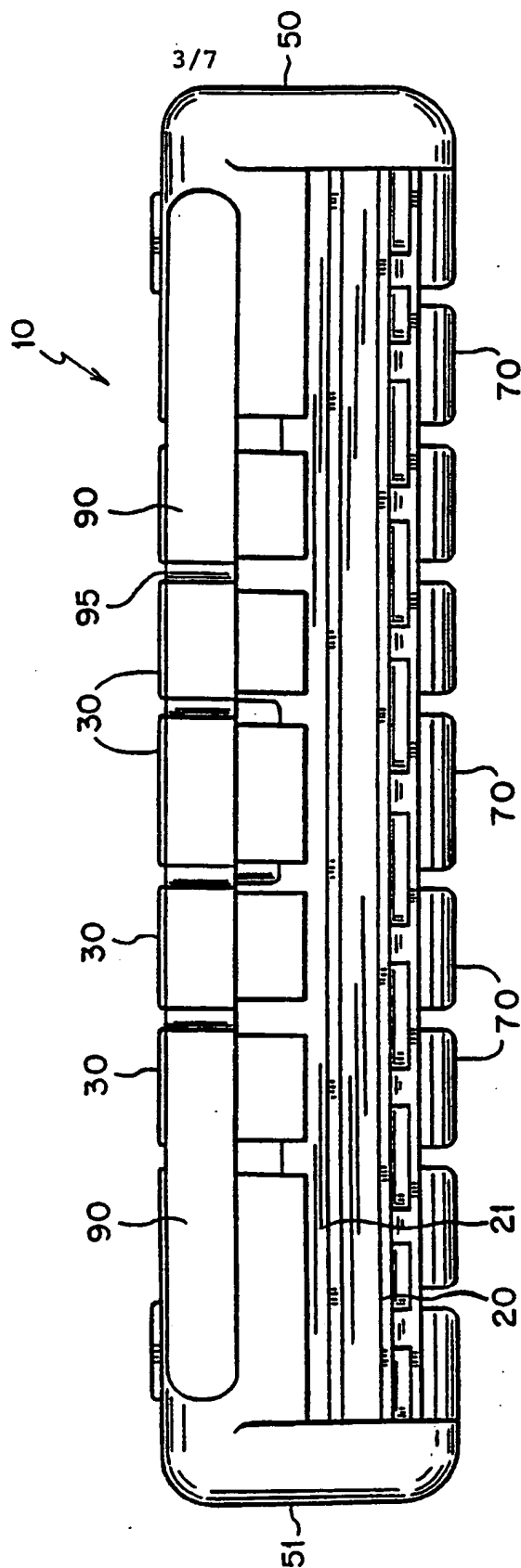


FIG. 6

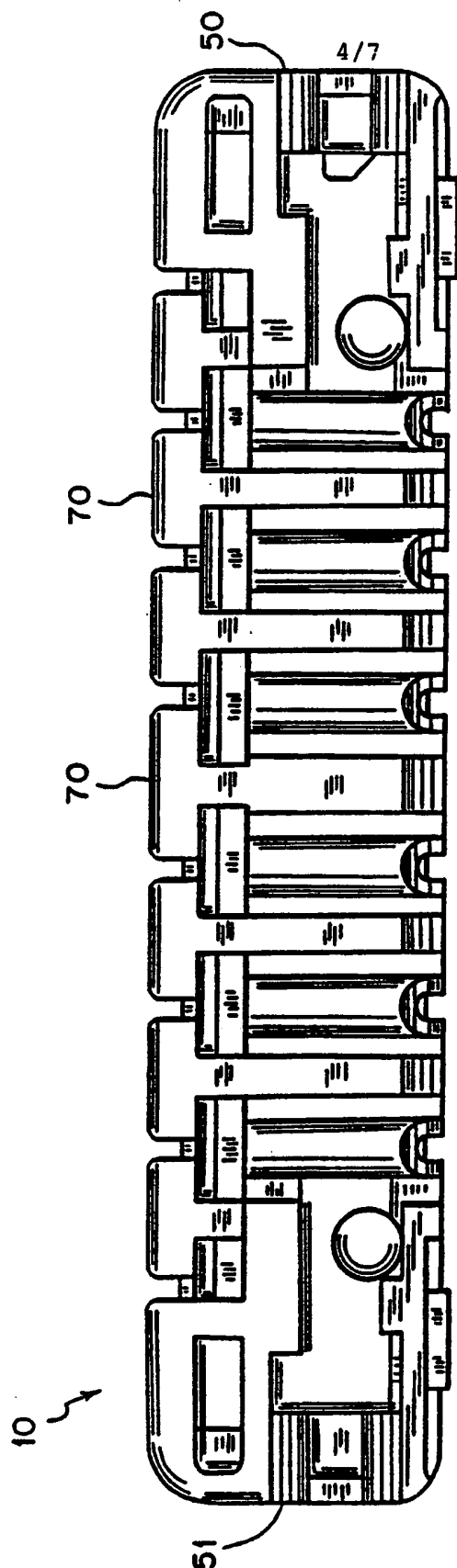


FIG. 7

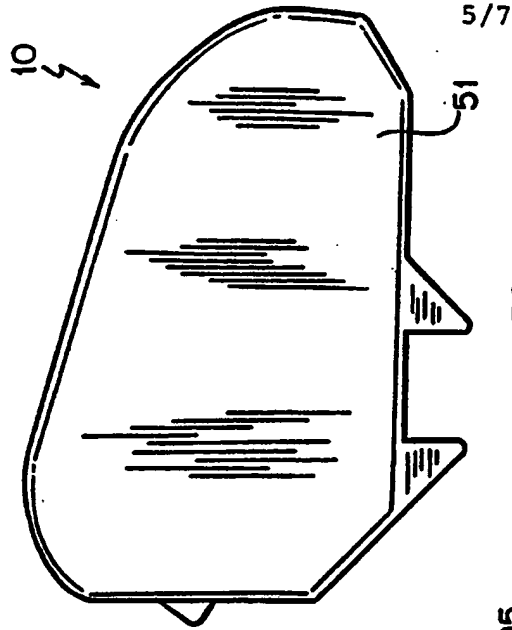


FIG. 5

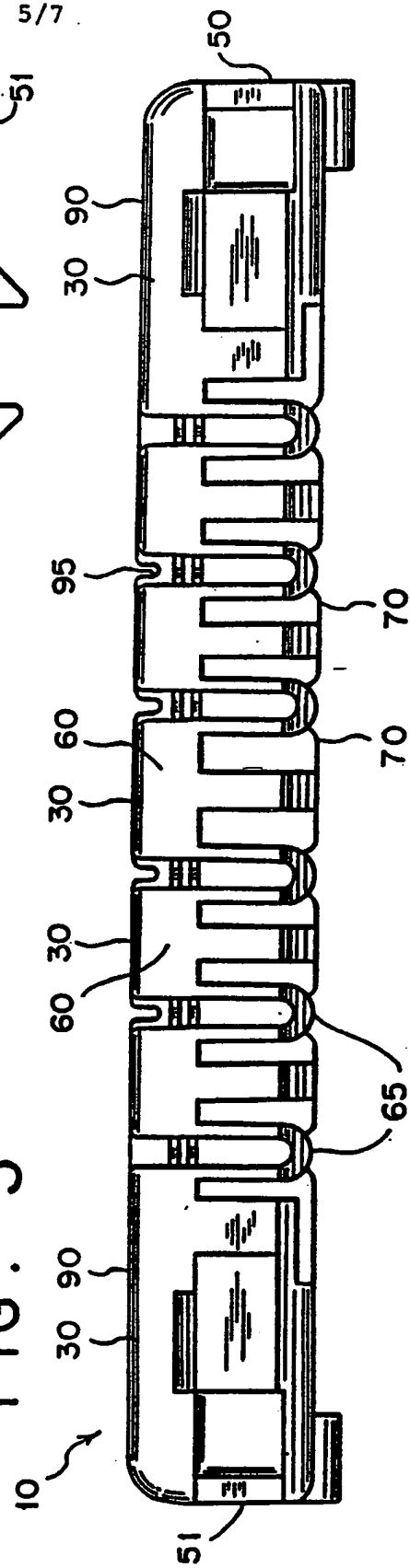
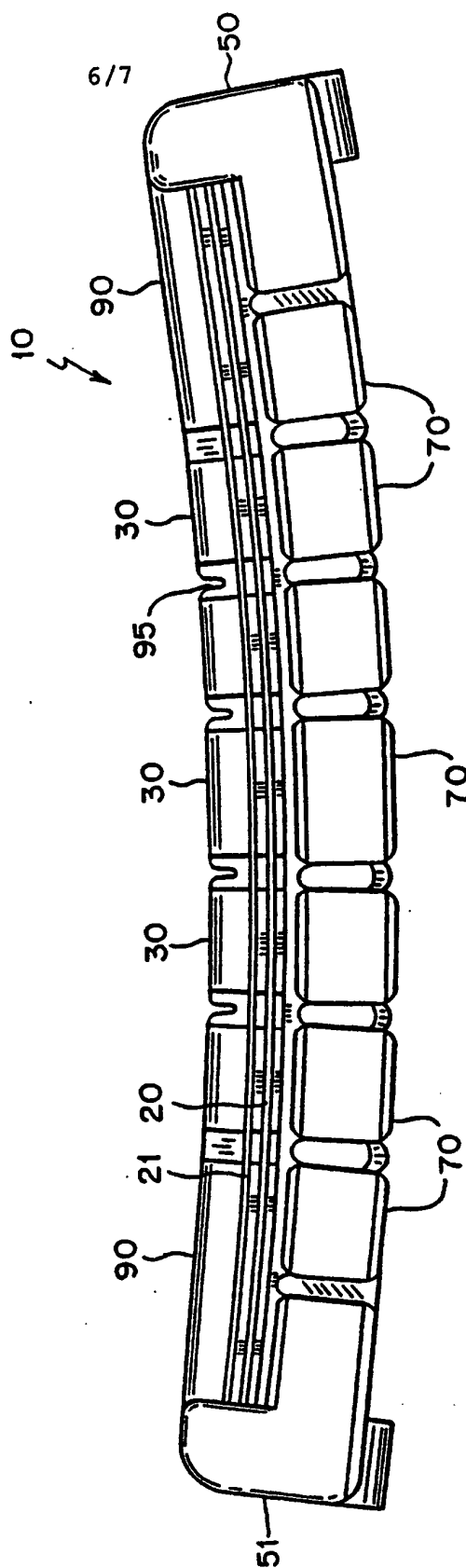
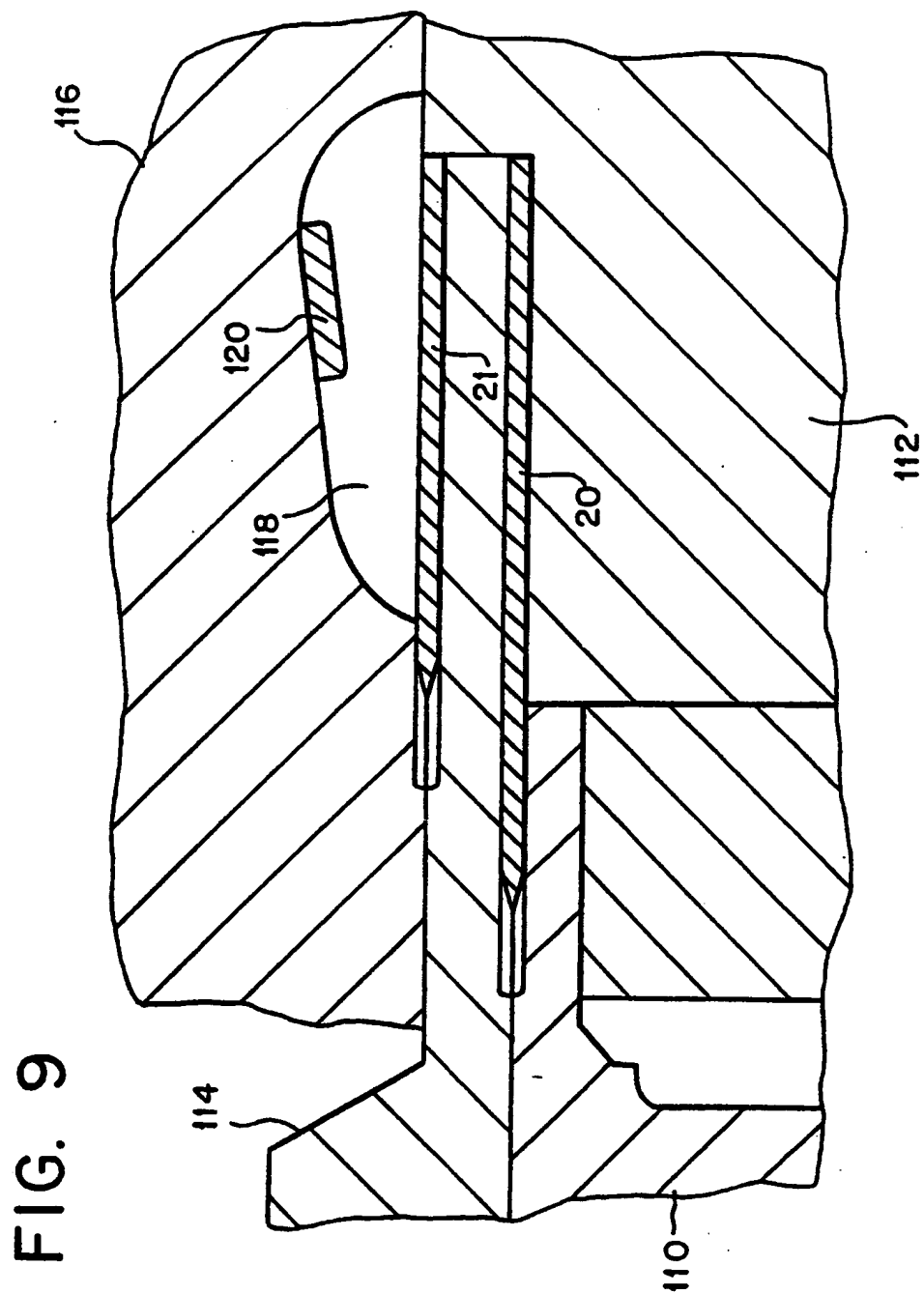


FIG. 8





INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 93/07678

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B26B 21/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B26B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DIALOG

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4854043 (CHEN), 8 August 1989 (08.08.89), figures 1,3, claim 1, abstract --	1-17
A	WO, A1, 9205925 (THE GILLETTE COMPANY), 16 April 1992 (16.04.92), page 4, line 32 - line 33, figure 1, claim 1, abstract --	1-17
A	WO, A1, 9206827 (THE GILLETTE COMPANY), 30 April 1992 (30.04.92), figure 1, claim 1, abstract --	1-17

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 93/07678

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO, A1, 9206828 (THE GILLETTE COMPANY), 30 April 1992 (30.04.92), page 1 - page 2, figure 1 --	1-17
A	EP, A1, 0275616 (WARNER-LAMBERT COMPANY), 27 July 1988 (27.07.88), figure 1, abstract -- -----	1-17

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INTERNATIONAL SEARCH REPORT

Information on patent family members

01/10/93

International application No.

PCT/US 93/07678

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